

# LIME MARMALADE

## Introduction

These notes are based on work carried out in the West Indies. It should be remembered that minor modifications to the formulation may be needed in other areas where different varieties of lime may be grown.

## Production

The production of traditional lime marmalade is perfectly feasible and the general principles for jam making apply.

Lime however, does present one unusual problem owing to its very high acidity. It will have been noted that the pH of a preserve has to lie between 3.0 and 3.3 in order to obtain a good stable gel (or 'set'). Most fruits lie in this pH range. Those above 3.3 require the addition of citric acid to bring the pH down to the required range. Lime juice however has a pH of 2.7 to 2.9 and so the PH has to be increased. This, it has been found, can be easily done with sodium bicarbonate (baking powder).

In this particular case it was found that the addition of 20g of sodium bicarbonate/litre of juice gave the required pH adjustment.

It should be noted that in other areas, or when using other lime varieties slightly different amounts of bicarbonate may be needed. If a pH meter is not available, outside advice may be needed. Alternatively, a series of small trial batches could be made up using different levels of bicarbonate and the best level found by checking the set.

The second problem in marmalade production is getting an even distribution of shredded peel throughout the product. If the correct technique is not used the peel tends to float.

The following ingredients are required:

Lime juice  
Shredded lime peel  
Sodium bicarbonate  
**Pectin**  
Sugar

### Lime juice

The extraction of lime juice is perhaps the most time consuming step for the small manufacturer. It is strongly recommended that if a local commercial lime processor exists, racked juice should be purchased in bulk.

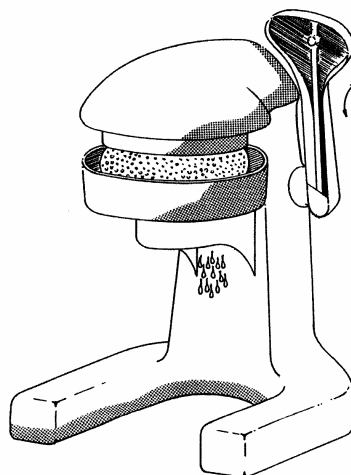


Figure 1: Small manual squeezer

If no such supplier exists then there is no alternative but to extract the juice oneself using small manual or electric squeezers see Figure 1. It must be remembered at all times the lime juice, being so acid, attacks metals. Only good quality food-grade plastic, stainless steel and wooden utensils should be used. The extracted juice needs to be strained to remove pulp prior to use. If required, lime juice can be stored in bulk preserved with 1000ppm sulphur dioxide (using 3g of sodium metabisulphite/l of juice).

## Lime peel

After the limes have been squeezed the peel needs to be cut into very thin strips about  $\frac{1}{2}$ " to 1" long and as thin as possible. Again a slow and tedious job which can be made easier if a small peeler is used as shown in Figure 2. If fresh peel is incorporated directly into the marmalade it will float - a very unsatisfactory product. The shredded peel needs to be saturated with sugar before use so that, having the same density as the marmalade, it stays where it should, evenly distributed through the jar.

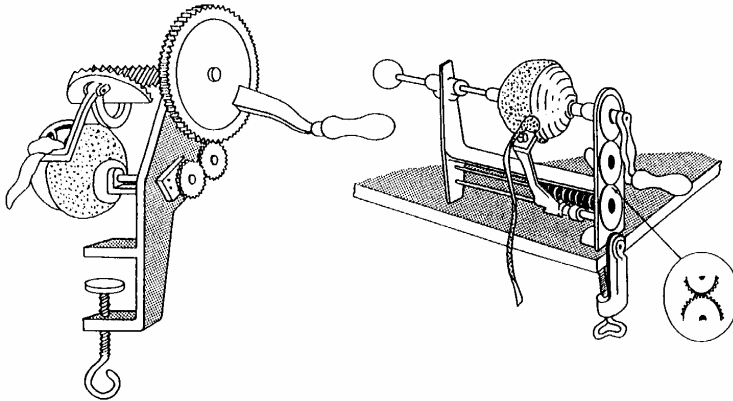


Figure 2: Small manual peeler

The shredded peel should be well mixed with dry sugar (1kg peel + 1kg sugar) and left in a sealed container for at least a week, mixing occasionally. At the end of this time the peel will be found to be floating in a heavy sugar syrup. The addition of sodium metabisulphate at the rate of 1g/1kg of peel will prevent the growth of moulds and yeasts.

This sweet mix of peel and sugar may well prove highly attractive to ants and insects. The entry of non-flying insects can be avoided if the container is standing in a trough of water. Entry of flying insects can be prevented by covering with a lid or netting.

## Pectin

If at all possible, it is far better to use commercially available pectin. If this proves to be impossible, pectin can be extracted from citrus peels or passion fruit rinds.

In the particular case being examined, commercial fast-set 150 SAG pectin was available. Prior to use pectin, needs to be dissolved and diluted to approximately 5 SAG. In this example, the pectin power needed to be diluted by a factor of 30 (obviously if another grade is available it is easy to work out this dilution ratio).

### Preparation of 5 SAG pectin working solution

30g of 150 SAG pectin  
150g sugar  
720ml water

- Dry mix the pectin and sugar thoroughly.
- Heat the water to 70-75°C and slowly add the sugar/pectin, mix with constant stirring. If a small electric stirrer is available there will be less chance of lumps forming.
- Heat to boiling and boil for 1 minute, again with constant stirring.
- Hold at 50-60°C (a double saucepan is useful here).

### Batch preparation

It is assumed that the reader will read the technical brief on jams and marmalade production which outlines the principles of jam boiling, and that a suitable heavy stainless steel pan or steam kettle is available together with a wooden stirrer, jam thermometer and possibly a refractometer (Figure 3).

#### Recipe

1 litre lime juice  
20g sodium bicarbonate  
3kg sugar  
1200g 5 SAG pectin (made up from 40g pectin, 200g sugar, 960ml water)  
Few drops of green food colour  
200g prepared sugared lime peel.

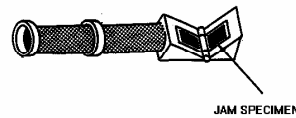
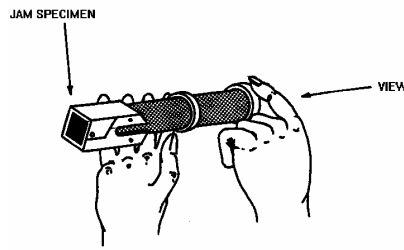


Figure 3: Refractometer

The lime juice, bicarbonate and half the sugar are placed in the pan, brought to the boil and boiled for 3 - 5 minutes with steady stirring (it is impossible to state boiling times exactly, as this depends on the heat source etc).

The remaining half of the sugar, peel, pectin and green colour are added and boiling continued until the required sugar level (68%) is reached (as measured either by refractometer, jam boiling thermometer or skill of the producer).

### Filling and capping

The finished preserve should be hot filled into clean, dry jars and capped immediately. Care is needed not to fill too hot or too cold, the ideal range being 82-85°C.

Filling whilst too hot can result in drops of steam condensing on the inside of the lid, falling back onto the surface of the product and so diluting it to below 68% sugar solids (so that moulds and yeasts can grow). Too cold filling carries the danger of microbiological contamination from the jar etc.

Jars should be capped quickly either with screw type or 'Omnia' type push-on lids. When fairly cool and a vacuum has formed (about 50°C) the jars should be rinsed in a bath of clean chlorinated water - one tablespoon of bleach per gallon.

When dried they may be labelled.

### Equipment required

pH meter (optional)  
Juice extractor  
Peeler  
Knives  
Plastic buckets  
Stainless steel pan  
Wooden spoons  
Gas ring or other heat source  
Jam thermometer or refractometer  
Capping machine  
Jar cooler (optional)  
Equipment suppliers

## Equipment suppliers

Note: This is a selective list of suppliers and does not imply endorsement by Practical Action.

### Juice extractor and peeler

Kenwood Limited  
New Lane  
Havant  
Hampshire  
PO9 2NH  
United Kingdom  
Tel: +44 (0) 23 9247 6000  
Fax: +44 (0) 23 9239 2400  
Website: <http://www.kenwood.co.uk/>  
Manufacture: Kenwood Chef, etc Worldwide distribution

Lehman Hardware and Appliances Inc.  
P.O. Box 41  
Kidron  
Ohio 44636  
USA  
Tel orders: +1 877 438 5346  
Tel enquiries: +1 888 438 5346  
E-mail: [info@lehmans.com](mailto:info@lehmans.com)  
Website: <http://www.lehmans.com>  
Suppliers of hand operated fruit presses and grinders.

### Refractometer

Bellingham + Stanley Ltd.  
Longfield Road, North Farm Industrial Estate  
Tunbridge Wells, Kent TN2 3EY  
United Kingdom  
Tel: +44 1892 500400  
Fax: +44 1892 543115  
E-mail: [sales@bs-ltd.com](mailto:sales@bs-ltd.com)  
Website: <http://www.bs-ltd.com/>